

What is claimed is:

1. A polynucleotide selected from the group consisting of:

5 (a) a polynucleotide encoding a protein comprising the amino acid sequence of SEQ ID NO: 2 or 4;

(b) a polynucleotide comprising a coding region of the nucleotide sequence of SEQ ID NO: 1 or 3;

10 (c) a polynucleotide comprising a nucleotide sequence encoding a protein having binding activity to afadin or actinin and comprising the amino acid sequence of SEQ ID NO: 2 or 4, in which the amino acids are substituted, deleted, inserted and/or added; and

15 (d) a polynucleotide which hybridizes under stringent conditions with a DNA comprising the nucleotide sequence of SEQ ID NO: 1 or 3 and which encodes a protein having binding activity to afadin or actinin.

2. A polypeptide encoded by the polynucleotide of claim 1.

3. A vector into which the polynucleotide of claim 1 is inserted.

20 4. A host cell carrying the polynucleotide of claim 1 or a vector into which the polynucleotide of claim 1 is inserted.

5. A method for producing the polypeptide encoded by the polynucleotide of claim 1, comprising the steps of culturing a host cell expressively carrying either said polynucleotide or a
25 vector into which said polynucleotide is inserted, and recovering the produced polypeptide from said host cell or culture supernatant thereof.

30 6. A polynucleotide which specifically hybridizes under highly stringent conditions to the polynucleotide of claim 1 and which comprises at least 15 nucleotides.

7. An antisense polynucleotide to the polynucleotide of claim 1, wherein said antisense polynucleotide suppresses the expression of the polynucleotide of claim 1.

8. An antibody which binds to the polypeptide of claim 2.

35 9. A method of screening for a candidate compound of an actin cytoskeleton-controlling agent, comprising the steps of:

(a) contacting afadin or actinin with the polypeptide of claim 2 and a test compound;

(b) measuring the binding activity of afadin or actinin to the polypeptide of claim 2; and

5 (c) selecting the test compound which alters the binding activity, compared with that which occurs in the absence of the test compound.

10 10. A method for assaying a heart disease which comprises the step of detecting the expression level of a gene encoding the polypeptide of claim 2 in a test subject, wherein an elevated level of gene expression as compared to control expression is indicative of heart disease.

11. The method for assaying a heart disease of claim 10, comprising the steps of:

15 (a) extracting an RNA sample from cardiac muscle cells of a test subject;

(b) measuring the amount of RNA encoding the polypeptide of claim 2 contained in said RNA sample; and

20 (c) comparing the amount of the measured RNA with a control, wherein an elevated level of RNA is indicative of heart disease.

12. The method for assaying a heart disease of claim 10, comprising the steps of:

(a) extracting a protein sample from cardiac muscle cells of a subject;

25 (b) measuring the amount of the polypeptide of claim 2 contained in said protein sample; and

(c) comparing the amount of the measured polypeptide with control, wherein an elevated level of polypeptide is indicative of heart disease.

30 13. The method for diagnosing a heart disease of any one of claims 10 to 12, wherein the heart disease is myocardial infarction or myocarditis.

14. The polynucleotide of claim 1, wherein said polynucleotide is the polynucleotide of (a).

35 15. The polynucleotide of claim 1, wherein said polynucleotide is the polynucleotide of (b).

16. The polynucleotide of claim 1, wherein the polynucleotide of (c) comprises the amino acid sequence of SEQ ID NO: 2 or 4, in which up to 10% of the amino acids are substituted, deleted, inserted, and/or added.

5 17. The polynucleotide of claim 1, wherein the polynucleotide (c) comprises a nucleotide sequence encoding a protein having at least 70% identity to SEQ ID NO: 2 or 4.

10 18. The polynucleotide of claim 1, wherein the polynucleotide (d) has at least 70% identity to SEQ ID NO: 1 or 3.

19. The polypeptide of claim 2, wherein the polypeptide has at least 70% identity to SEQ ID NO: 2 or 4.

20. The polypeptide of claim 2, wherein the polypeptide comprises the amino acid sequence of SEQ ID NO: 2 or 4.